

CLAIMS

That which is claimed is:

1. A method of treating an eye, comprising the steps of:
 identifying an area of an eye;
 focusing a device capable of directing high intensity focused ultrasound (HIFU) energy on the area;
 generating HIFU energy from the device onto the area;
 wherein the energy transfer from the device to the area results in an increase in temperature of the area.
2. The method of claim 1, wherein the energy transfer results in contracting the area.
3. The method of claim 2, wherein the contracting increases tension on a component of the eye in connection with a lens of the eye.
4. The method of claim 2, wherein the contracting increases tension on a component of the eye in an amount sufficient to treat presbyopia.
5. The method of claim 4, wherein the component of the eye is selected from the group consisting of a ciliary muscle, a zonule, and a peripheral lens capsule.
6. The method of claim 2, wherein the contracting occurs to a peripheral lens capsule and secondarily increases tension of on zonules of the eye.
7. The method of claim 1, further comprising:
 repeating the identifying, focusing and generating a plurality of times on areas of the eye which result in contracting thereby resulting in treating presbyopia.

8. The method of claim 1, wherein the area is on a component of the eye selected from the group consisting of inner scleral tissue, longitudinal ciliary muscle tissue and ciliary epithelium.
9. The method of claim 7, wherein the area is on a component of the eye selected from the group consisting of zonular fibers and peripheral zonules.
10. The method of claim 1, wherein the area is on a component of the eye selected from the group consisting of peripheral lens capsule tissue and peripheral lens cellular architecture.
11. The method of claim 7 where the repeating creates an additive effect, and wherein the energy is provided circumferentially on each area.
12. The method of claim 7, wherein said repeating is continued in a manner so as to result in contracting a distance of about 50 microns or more.
13. The method of claim 12, wherein said contracting is about 100 microns or more.
14. The method of claim 13, wherein said contracting is about 200 microns or more.
15. The method of claim 14, wherein said contracting is about 300 microns or more.
16. The method of claim 1, wherein the energy results in slowing lens diameter growth.
17. The method of claim 1, wherein the energy transfer alters the modulus of elasticity of a lens capsule of the eye.
18. The method of claim 1, wherein the area has no dimension larger than 2 millimeters.

19. The method of claim 1, wherein the area has no dimension larger than 1 millimeter.
20. The method of claim 1, wherein the HIFU energy increases the temperature of the area to a temperature in a range from about 47 °C to about 100 °C.
21. The method of claim 1, wherein the HIFU energy increases the temperature of the area to a temperature in a range from about 47 °C to about 80 °C.
22. The method of claim 1, wherein the HIFU energy increases the temperature of the area to a temperature in a range from about 60 °C to about 70 °C.
23. The method of claim 1, wherein said identifying step comprises applying ultrasound scanning imaging to identify the area
24. The method of Claim 1, wherein said generating is in a pulse having a duration of two seconds or less.
25. A method to treat presbyopia comprising the steps of:
 - identifying an area on a presbyopic eye;
 - focusing a device capable of directing HIFU energy on the area;
 - generating HIFU energy from the device onto the area;
 - wherein the energy transfer from the device to the area results in an increase in temperature of the area; and
 - wherein said energy transfer results in alleviating the eye from its presbyopic condition.
26. The method of claim 25, wherein said alleviation improves accommodation in the eye.
27. A method of preventing presbyopia by prophylactically treating a non-presbyopic eye comprising the steps of:

identifying an area on the eye;
focusing a device capable of directing HIFU energy on the area;
generating HIFU energy from the device onto the area; wherein the energy transfer from the device to the area results in an increase in temperature of the area; and wherein said energy transfer results in preventing the eye from presbyopia.

28. An apparatus capable of generating HIFU energy comprising:
a transducer comprising ceramic piezoelectric crystals;
wherein said transducer applies HIFU energy to a discrete region within an eye without damaging nearby structures.
29. The apparatus of Claim 28, wherein said transducer has a diameter in a range from about 8 to 10 cm.
30. The apparatus of Claim 28, wherein said transducer has a focal length ranging from 1 mm to 50 mm.
31. The apparatus of Claim 30, wherein said focal length ranges from about 4 mm to 10 mm.
32. The apparatus of Claim 28, wherein said transducer has a radius of curvature at about 15cm.
33. The apparatus of Claim 28, wherein said transducer operates from about 0.5 MHz to about 10 MHz.
34. The apparatus of Claim 28, wherein said transducer comprises an output range from about 100 to 300 watts.
35. The apparatus of Claim 28, wherein said transducer comprises an output ranges from about 0.1 watts to 50 watts.

36. The apparatus of claim 28, comprising a plurality of transducers.